AMENDMENTS TO THE SPECIFICATION:

Please amend the specification as follows:

Please amend paragraph [034] as indicated:

[034] In accordance with some embodiments of the present invention, a high ~~refractive~~ refractive index contrast multimode slab waveguide of an appropriate design to collect and contain a high proportion of the light emitted by a single or multi-element multi-mode pump laser diode and efficiently couple that light into an assembly of actively doped single-mode waveguides embedded within the slab is presented. The light from the pump source, then, is efficiently coupled into one or more active regions through the effects of the differences in refractive index between the slab material of the waveguide and the cladding material around the slab. Both the slab material and the cladding material can be deposited with a high degree of uniformity and control in order to obtain the coupling. Further, the embedded active core material of the waveguide can also be manufactured with a high degree of uniformity and control.

Please amend paragraph [036] as indicated:

[036] In some embodiments of the invention, the multimode slab waveguide itself is pumped. This effect can result in a ~~slap~~slab light source.

Please amend paragraph [041] as indicated:

[041] **Figure 3A**, for example, illustrates integration of an optical waveguide 301 with a photodetector (PD) 302. Photodetector 302 is formed on semiconducting layer 305. An optical

layer 303 is formed over photodiode 302 and waveguide 301 is formed on optical layer 303. A cover layer 304 may be formed over waveguide 301. Light traveling through waveguide 301 can be coupled onto photodetector 302 at coupler 306.

Please amend paragraph [050] as indicated:

[050] **Figures 6A and 6B** illustrate coupling of light from a laser diode array into a planar waveguide in accordance with the present invention. As shown in **Figures 6A and 6B**, the light beam from laser diodes 616 of multimode laser diode array 610 diverges less in the slow axis direction (shown in **Figure 6A**) than it does in the fast axis direction (shown in **Figure 6B**). The output beams from laser diode array 610 diverge more in the vertical axis (shown in **Figure 6B**) than in the horizontal axis (shown in **Figure 6A**). Embodiments of the present invention take advantage of the slow divergence in the horizontal axis to increase the optical density in high refractive index waveguide 612. Coupling chip 611 can include a large lens duct 613 to direct light into high refractive index waveguide 612. The material of waveguide 612 and lens duct 613 can be the same material and can be deposited and patterned on a substrate in the same series of processing steps. Light from waveguide 612 can then be coupled into multimode fiber 614.

Please amend paragraph [059] as indicated:

[059] **Figure 8A** shows the slow axis view (i.e., the horizontal view) and **Figure 8B** shows the fast-axis view (i.e., the vertical cross section) of an active waveguide amplifier or laser chip 801 pumped by a multimode laser diode array in accordance with the present invention. As shown in **Figure 8A**, a single mode high refractive index contrast core 803 is arranged on chip

801. Although a spiral arrangement is shown in **Figure 8A**, any arrangement that provides a long signal path between a single mode input fiber 807 and a single mode output fiber 808 can be implemented. Light output from laser diode array 802 is captured by an intermediate refractive index contrast cladding layer 804 in which the single-mode high refractive index contrast active waveguide 803 is embedded. **Figure 8B** shows a cross section of an area of chip 801 with multiple crossings of single-mode high refractive index contrast active waveguide 803. As an example, active waveguide 803 can be formed from Yb-doped Al_2O_3, Y_2O_3 or TiO_2. Intermediate refractive index contrast cladding 804 can be formed from Al_2O_3 or Y_2O_3. In this arrangement, a high pump-power density can be achieved in multi-mode cladding 804, which results in highly efficient pumping of active waveguide 803. <u>Cladding 804 may be surrounded by layers 805 and 806.</u>

Please amend paragraph [068] as indicated:

[068] Image concentrator 1101 can include an addressable array pump bar 1102 which is capable of addressing and exciting individual pixels of a microchip bar 1103. Array pump bar 1102 includes an array of laser diodes which produce light when individually addressed. Microchip bar 1103, which provides amplification as was discussed in **Figures 6-8**. Beam concentrator chip 1104 can include light ducts or vertical tapers in order to collect a substantial amount of light from microchip bar 1103. Further, a vertical reverse taper 1106, as is described in U.S. Application Serial No. 10/101,492, allows for a compressed output mode. As shown in **Figure 11**, the mode of the beam output by beam concentrator chip 1104 is much smaller than the mode of the beam in microchip bar 1103. In some embodiments, a monolithic array beam

concentrator chip can convert 50 μm or 90 μm diameter single mode spots from microchip bar 1103 into 20 to 25 μm diameter spots <u>on window 1105</u>.

Please amend paragraph [071] as indicated:

[071] **Figure 13** illustrates a vertical cavity surface emitting laser (VCSEL)-pumped microchip 1401 according to the present invention. VCSELs ~~1401~~<u>1403</u> can be deposited on a GaAs substrate 1402. VCSELs ~~1401~~<u>1403</u> include a dichroic output facet coating. An active gain medium 1404 can be deposited directly over VCSELs 1403. Active gain medium 1404 can be, for example, Nd, Yb, Er, Tm, Ho, Pr, or Ce doped silica. A saturable absorber 1405 can be deposited over gain medium 1404. Saturable absorber 1405 can be, for example, a Cr4+ or Co2+ doped silica film. A VCSEL pumped microchip 1401 can be fabricated using high volume wafer-scale semiconductor manufacturing techniques. The doped silica used for saturable absorber 1405 and active gain medium 1404, for example, can be deposited by biased pulsed-DC PVD processing techniques.